

**PEPPER HAMILTON LLP DRAFT 8/29/01**

In re Application of :  
COZZETTE et al. :  
Serial No.: To be assigned : Group Art Unit: Unassigned  
Filed: August 30, 2001 : Examiner: Unassigned  
For: WHOLLY MICROFABRICATED BIOSENSORS AND  
PROCESS FOR THE MANUFACTURE THEREOF

**PRELIMINARY AMENDMENT**

Commissioner for Patents  
Washington, DC 20231

Sir:

Prior to examination of the above-referenced application, please amend the application as follows:

IN THE TITLE

Please change the Title of the Invention to:

--System And Method Of Microdispensing And Arrays Of Biolayers Provided By Same--.

IN THE SPECIFICATION

At page 1, please change the paragraph under CROSS REFERENCE TO RELATED APPLICATIONS to:

--This application is a continuation of co-pending U. S. Application Serial No. 09/193,370, filed Nov. 17, 1998, which is a division of U. S. Application Serial No. 08/484,095, filed June 7, 1995, now U. S. Patent No. 5,837,454, which is a division of U. S. Application Serial No. 07/943,345, filed Sept. 10, 1992, now U. S. Patent No. 5,466,575, which is a division of U. S. Application Serial No. 07/432,714, filed Nov. 7, 1989, now U. S. Patent No. 5,200,051, which is a continuation-in-part of U. S. Application Serial No. 07/381,223, filed July 13, 1989, now abandoned, which is a continuation-in-part of U. S. Application Serial No. 07/270,171, filed Nov. 14, 1988, now abandoned.--

#### IN THE CLAIMS

Please cancel claims 2-114, without prejudice or disclaimer.

Please add the following new claims:

115. An automated system for microdispensing programmable amounts of materials, including one or more bioactive molecules, comprising a chuck having a substantially planar surface and one or more syringes, the displacement of at least one of the chuck and the one or more syringes being alterable in one direction or multidirectionally.

116. The system of claim 115 in which the displacement is alterable vertically, horizontally, laterally, or rotationally.

117. The system of claim 115 in which the displacement of the chuck is alterable in the horizontal direction.

118. The system of claim 117 in which the displacement of the chuck is alterable in the horizontal and lateral directions.

119. The system of claim 118 in which the displacement of the chuck is alterable in the horizontal and lateral directions and the displacement of the one or more syringes is alterable in the vertical direction.

120. The system of claim 115 in which the chuck is a vacuum chuck, which can hold a substantially planar substrate.

121. The system of claim 115 in which the movement of both the chuck and the one or more syringes is controlled via a single personal computer.

122. The system of claim 115 in which the position of the chuck is reproducible within  $\pm 13$  microns or better in either horizontal or lateral directions.

123. An automated system for microdispensing programmable amounts of materials, including one or more bioactive molecules, comprising a chuck having a substantially planar surface and one or more syringes, the displacement of the chuck and the one or more syringes being alterable in at least one direction.

124. The automated system of claim 123 in which the displacement of the chuck is alterable multidirectionally.

125. The automated system of claim 124 in which the displacement of the one or more syringes is alterable in one direction.

126. An automated system for microdispensing programmable amounts of materials, including one or more bioactive molecules, comprising a vacuum chuck and a plurality of

syringe assemblies, the displacement of the vacuum chuck or syringe assemblies or both being alterable in one direction or multidirectionally.

127. The system of claim 126 in which the syringe assemblies are independently controllable.

128. A method of microdispensing a controlled volume of liquid onto a surface comprising positioning over a surface a needle tip on which tip a drop of liquid is or is then partially formed, contacting the surface with the partially formed drop, and retracting the needle tip such that a controlled volume of liquid less than that of the partially formed drop remains on the surface.

129. The method of claim 128 in which the surface is substantially planar.

130. The method of claim 128 in which the volume of liquid reproducibly dispensed is about one-one thousandth of the drop size or greater.

131. The method of claim 128 in which an exterior surface of the needle is coated with a material that modifies fluid adhesion.

132. The method of claim 131 in which the coating is hydrophobic.

133. The method of claim 131 in which the coating is hydrophilic.

134. The method of claim 128 which further comprises tailoring the surface free energy of the surface onto which the liquid is dispensed.

135. The method of claim 128 in which the surface onto which the liquid is dispensed is pretreated with a plasma.

136. The method of claim 135 in which the plasma comprises tetrafluoromethane, trifluoromethane, oxygen, hydrogen, water, argon, or nitrogen.

137. The method of claim 128 which provides for the deposition of arrays of bilayers.

138. The method of claim 128 in which the volume of liquid reproducibly dispensed is that of a proteinaceous mixture.

139. The method of claim 128 in which the volume of liquid reproducibly dispensed includes one or more bioactive molecules.

140. The method of claim 139 in which the one or more bioactive molecules include DNA, RNA, or a mixture thereof.

141. The method of claim 139 in which the one or more bioactive molecules include a single-stranded polynucleotide.

142. The method of claim 139 in which the one or more bioactive molecules include polypeptides, proteins, glycoproteins, or mixtures thereof.

143. The method of claim 128 in which the surface is that of a wafer.

144. An array of bilayers comprising one or more bioactive molecules, the array provided by microdispensing a controlled volume of liquid, including one or more bioactive molecules, onto a substantially planar surface.

145. The array of claim 144 in which the microdispensing step comprises positioning over the substantially planar surface a needle tip on which tip a drop of liquid is or is then partially formed, contacting the planar surface with the partially formed drop, and retracting the

needle tip such that a controlled volume of liquid less than that of the partially formed drop remains on the substantially planar surface.

146. The array of claim 144 in which the array of biolayers is arranged in a horizontal direction.

147. The array of claim 144 in which the array of biolayers is arranged in a horizontal direction and a lateral direction.

148. The array of claim 144 in which the one or more bioactive molecules include DNA, RNA, or a mixture thereof.

149. The array of claim 144 in which the one or more bioactive molecules include a single-stranded polynucleotide.

150. The array of claim 144 in which the one or more bioactive molecules include polypeptides, proteins, glycoproteins, or mixtures thereof.

151. The array of claim 144 in which the substantially planar surface is that of a biosensing device.

IN THE ABSTRACT

Please change the Abstract to:

--A system and a method of microdispensing materials, including liquids containing one or more bioactive molecules, are provided. Controlled volumes are reproducibly dispensed onto preselected areas of a surface, e.g., the surface of a biosensing device. Arrays of biolayers are thus provided, which may include one or more bioactive molecules, such as polypeptides or polynucleotides.--

**REMARKS**

Claims 2-114 have been canceled without prejudice. New claims 115-151 have been added. It is respectfully asserted that no new matter has been introduced by the present amendment. Adequate support for the subject matter of the new claims can be found in the specification as filed and in the claims of U. S. Patent No. 5,554,339 (the “’339 patent”), which matured from related U. S. Application Serial No. 08/109,507, filed Aug. 19, 1993. The existence of the ‘339 patent is thus respectfully brought to the attention of the Examiner herewith.

In particular, adequate support for new independent claims 115, 123 and 126 can be found on col. 57, line 47 et seq. of the ‘339 patent (that is, Section 5.4 of the specification, as filed). New independent claim 128 derives support from col. 59, lines 37-54, of the ‘339 patent, for example. New independent claim 144 finds support from col. 61, lines 7-9, of the ‘339 patent, for example. In addition, issued claims of the ‘339 patent provide ready references for the types of bioactive molecules that are listed in dependent subject matter being claimed in the present application. Applicants also bring to the Examiner’s attention Figs. 12 and 13 of the specification, as filed, which provides further support for the claimed invention.

Entry of the preliminary amendment is respectfully requested. A prompt action allowing the pending claims is respectfully solicited.



AUTHORIZATION

No fee is believed necessary. However, the Commissioner is hereby authorized to charge any additional fees which may be required for this submission, or credit any overpayment to deposit account no. 50-0436.

Respectfully submitted,

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